

WHAT IS CLAIMED IS:

1. A projection optical system for projecting a pattern of a first object onto a second object, characterized in that said projection optical system
5 is provided with birefringence correcting means for correcting birefringence of an optical element of said projection optical system.

2. A projection optical system according to
10 Claim 1, wherein said birefringence correcting means comprises at least one optical member having predetermined form birefringence.

3. A projection optical system according to
15 Claim 2, wherein said at least one optical member is arranged so that a distribution, including a distribution of form birefringence produced by said at least one optical member, is effective to cancel the birefringence to be produced by an optical element of
20 said projection optical system.

4. A projection optical system according to Claim 2 or 3, wherein said at least one optical member is arranged to produce form birefringence on the basis
25 of a diffraction grating having a period smaller than a wavelength used.

5. A projection optical system according to Claim 1, wherein said diffraction grating is provided on the surface of the optical element of said projection optical system.

5

6. A projection optical system according to Claim 1, wherein said birefringence correcting means comprises at least one optical member having a predetermined stress distribution.

10

7. A projection optical system according to Claim 6, wherein said at least one optical member is arranged so that a distribution, including a distribution of stresses produced by said at least one optical member, is effective to cancel the birefringence to be produced by an optical element of said projection optical system.

15

8. A projection exposure apparatus, comprising:
an illumination system for illuminating a first object with light; and

20

a projection optical system as recited in any one of Claims 1 - 7, for projecting a pattern of the first object illuminated with the light from said illumination system, onto a second object for exposure of the same.

25

9. A projection exposure apparatus, comprising:
illuminating means for illuminating a first
object with slit-like light;

scanning means; and

5 a projection optical system as recited in any
one of Claims 1 - 7, for projecting a pattern of the
first object onto a second object while the first and
second objects are simultaneously scanned in a
widthwise direction of the slit-like light, at a speed
10 ratio corresponding to a projection magnification of
said projection optical system.

10. A device manufacturing method including a
process for printing a device pattern on a substrate
15 by use of a projection exposure apparatus as recited
in Claim 8 or 9.

Add
~~20~~
B1

Add
C1

25

Add
D6

Add
E2